A.P. COMPUTER PRODUCTS

8 DIVISION STREET HOLTSVILLE, NEW YORK 11742
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APPLE II

PEEKS

POKES

& CALLS

A MINI-ENCYCLOPEDIA OF PEEKS, POKES AND CALLS.
AN INVALUABLE PROGRAMMING AID FOR ALL APPLE OWNERS.

PEEKS, POKES & CALLS

COLORS
LOW-RES

0=BLACK	1=MAGENTA	2=DARK BLUE
3=LIGHT PURPLE	4=DARK GREEN	5=GRAY
6=MEDIUM BLUE	7=LIGHT BLUE	8=BROWN
9=ORANGE	10=GRAY	11=PINK
12=GREEN	13=YELLOW	14=AQUA
15=WHITE		

CALL -2048	PLOT A POINT (AC:Y-COORD Y:X-COORD).
CALL -2023	DRAW A HORIZONTAL LINE.
CALL -2008	DRAW A VERTICAL LINE.
CALL -1998	CLEAR LO-RES SCREEN 1 CLEAR SCREEN-GRAPHICS MODE.
CALL -1994	CLEAR UPPER 20 LINES OF TEXT PAGE 1 TO REVERSE 0. IF IN LOW-RES GR THIS CLEARS UPPER 40 LINES TO BLACK (PAGE 1 ONLY).
CALL -1977	CALCULATE GRAPHICS BASE ADDRESS.
CALL -1953	INCREMENT COLOR BY 2.
CALL -1948	ADJUST COLOR BYTE FOR BOTH HALVES EQUAL.
CALL -1935	MONITOR S/R TO GET SCREEN COLOR (AC:Y-COORD Y:X-COORD). SEE CALL-APPLE DEC 1978.
	HI-RES
POKE 800,H	SETS HORIZONTAL COORDINATE. H=MODULUS 256
POKE 801,H/256	H=0 (LEFT) TO 279 (RIGHT).
	BOTH POKE 800 & 801 ARE REQUIRED.
POKE 802,V	SETS VERTICAL COORDINATE.
	V=0 (TOP) TO 159 (BOTTOM)
POKE 804,S	STARTING ADDRESS OF SHAPE TABLE. S=MODULUS 256
POKE 805,S/256	BOTH 804 & 805 ARE REQUIRED.
POKE 28,C	COLOR OF SHAPE.
POKE 806,S	SETS SCALE OF SHAPE S(1.
POKE 807,R	SETS ROTATION OF SHAPE (R=1 TO 64).
	0=RIGHT SIDE UP, 16=90 DEGREES CLOCKWISE.

0=BLACK 1 (0)	1=GREEN (85)	2=VIOLET (170)
3=WHITE 1 (255)	4=BLACK 2	5=ORANGE
6=BLUE	7=WHITE 2	

POKE 812,X	SETS COLOR FOR HI-RES.
	X=NUMBER OF COLOR IN PARENTHESIS.
CALL 3072	"INIT"-INITIALIZES HI-RES (-12288).
CALL 3986	"CLEAR"-CLEARS THE SCREEN (-12274).
CALL 3780	"PLOT"-PLOTS A POINT ON THE SCREEN (-11580).
CALL?3761	"POSN"-POSITIONS A POINT ON THE SCREEN.
?(-11527) MICRO	?(-11599) PG ?(-11780) SHELDON
CALL?3786 PG	"LINE"-DRAWS LINE (X0;Y0;COLOR)
?(-11500) MICRO	?(-11574) PG ?(-11465) PG
CALL -11780 M	"FIND" OR ? POSITION
-12272 S	"FIND" OR BACKGROUND
	(HCOLOR 1 SET FOR BLACK BACKGROUND).
CALL -11471	HI-RES GRAPHICS BKGRND (PARAM=COLOR)
CALL 3805 PG	"SHAPE"-DRAWS PREDEFINED SHAPE.
(-11555) PG	
CALL -11462	HI-RES DRAW1(X0;Y0;COLOR)
CALL -11335	HI-RES SHLOAD
224-226	HI-RES GR X&Y COORDINATES
228	HI-RES GR COLOR BYTE

OTHER

POKE 72,0?PG	GO TO MONITOR
CALL -151	GO TO MONITOR
CALL -3318	CONTINUE
CALL -3774	SAVE
CALL -3776	SAVE INTEGER PROGRAM TO TAPE.
CALL -3973	LOAD INTEGER PROGRAM FROM TAPE.
CALL -4116	RUN INTEGER (KILLS VARIABLES).
CALL -6090	RUN INTEGER (SAVES VARIABLES).
CALL -6729	PLOTS A POINT ON THE SCREEN.
CALL -6739	NEW
CALL -8117	LIST INTEGER PROGRAM.
CALL -8192	RESET INTEGER BASIC. KILLS VARIABLES AND CLEARS WORKSPACE.
CALL -2458	TURN ON MINI-ASSEMBLER.
CALL -2423	SWEET-16 INTERPRETER ENTRY.
CALL -1906	MONITOR S/R DISASSEMBLER ENTRY.
CALL -1728	MONITER S/R-PRINT CONTENTS OF X & Y (REG 9 AS 4 HEX DIGITS.
CALL -1716	MONITOAR S/R PRINT X BLANKS (X REG CONTAINS # TO PRINT).
CALL -1402	MONITOR S/R-IRQ HANDLER.
CALL -1390	MONITOR S/R-BREAK HANDLER.
CALL -1321	MONITOR S/R TO DISPLAY USER REGISTERS.
CALL -1233	MONITOR S/R SCREEN INIT.
CALL -1223	MONITOR S/R SET SCREEN TO TEXT MODE (DESTROYS ACCUMULATOR).
CALL -1216	MONITOR S/R SET GRAPHICS MODE (GR) (DESTROYS ACCUMULATOR).
CALL -1205	MONITOR S/R SET NORMAL WINDOW.
CALL -1181	MONITOR S/R MULTIPLY ROUTINE.
CALL -1148	MONITOR S/R DIVIDE ROUTINE.
CALL -1087	MONITOR S/R CALCULATE TEXT BASE ADDRESS.
CALL -1052	MONITOR S/R SOUND BELL.
CALL -1036	MONITOR S/R MOVE CURSOR RIGHT.
CALL -1027	MONITOR S/R OUTPUT A-REG. AS ASCII ON TEXT SCREEN 1.
CALL -1008	MONITOR S/R TO MOVE CURSOR LEFT.
CALL -998	MONITOR S/R TO MOVE CURSOR UP.
CALL -990	MONITOR S/R PERFORM A VERTICAL TAB TO ROW IN ACCUMULATOR.
CALL -980	MONITOR S/R PERFORM ESCAPE FUNCTION.
CALL -936	MONITOR S/R HOME CURSOR & CLEAR SCREEN (DESTROYS ACCUMULATOR AND Y REGISTER).
CALL -926	MONITOR S/R PERFORM A CARRIAGE RETURN.
CALL -922	MONITOR S/R PERFORM A LINE FEED.
CALL -912	MONITOR S/R SCROLL UP 1 LINE (DESTROYS ACCUM. AND Y REGISTER.
CALL -868	MONITOR S/R CLEAR TO END OF LINE.
CALL -856	WAIT LOOP
CALL -756	GET KEY INPUT FROM KEYBOARD (DESTROYS ACCUMUL. AND Y REGISTER). WAIT FOR KEY PRESS.
CALL -741	MONITOR S/R KEYIN ROUTINE.
CALL -715	READ KEY & PERFORM ESCAPE FUNCTION IF NECESSARY.
CALL -670	PERFORM LINE CANCEL.
CALL -665	PERFORM CARRIAGE RETURN & GET LINE OF TEXT.
CALL -662	GET LINE OF TEXT FROM KEYBOARD (X RETND WITH NUMBER OF CHARACTERS).
CALL -657	WAIT FOR INPUT.

PEEKS, POKES & CALLS

```
INTEGER BASIC QUICK HIRES CLEAR 10 DIM C$(40):
   20 C$="2000:0 2001(2000.3FFEM E88AG"
   30 FOR I=1 TO LEN (C$)
   40 POKE 511+I,ASC(C$(I))
   50 NEXT I
   60 POKE 72,0
   70 CALL -144
   80 POKE -22482,195
FOR PAGE TWO:
   20 C$="4000:0 4001(4000.5FFEM E88AG"
CLEAR SCREEN:  CALL -936


==================================

RE-ENTER DOS
9D8F OR 3D0 CTRL-C
9D84 OR 3D3 CTRL-B (NEW)
9DEA RESTORE 3D0-3FF
            BLOAD FINDER
THIS ROUTINE THANKS TO GREG-CL0575 WILL FIND THE STARTING
ADDRESS AND LENGTH OF THE LAST BLOADED FILE:
2F5.350
2F5- A9 00 8D
2F8- 8C A3 A9 03 8D 8D A3 60
300- 20 4A FF A0 FF C8 B9 3C
308- 03 20 ED FD C9 A4 D0 F5
310- AD 73 AA AE 72 AA 20 41
318- F9 A9 AC 20 ED FD A9 A0
320- 20 ED FD A9 CC 20 ED FD
328- A9 A4 20 ED FD AD 61 AA
330- AE 60 AA 20 41 F9 20 3F
338- FF 4C 71 A4 8D C2 CC CF
340- C1 C4 C5 C4 BA A0 C1 A4
CONTRIBUTORS TO DATE:
TCI369-FRANK  CL0575-GREG
```

APPLE II PEEKS, POKES, AND CALLS

NOTE: THIS MATERIAL STILL UNDER DEVELOPMENT. "?" INDICATES UNCERTAINTY. COMMENTS AND CORRECTIONS ARE WELCOME.

SCROLLING WINDOW

```
POKE 32,L      SETS LEFT SIDE  OF SCROLLING WINDOW (L=0 TO 39)
POKE 33,W      SETS WIDTH OF SCROLLING WINDOW (W=1 TO 40-L)
POKE 34,T      SET TOP OF SCROLLING WINDOW (T=0 TO 23)
POKE 35,B      SETS BOTTOM OF SCROLLING WINDOW (B=0 TO 23;B)T)
```

CURSOR POSITION

```
POKE 36,CH     SETS HORIZONTAL CURSOR POSITION (CH=0 TO 39)
POKE 37,CV     SETS VERTICAL CURSOR POSITION (CV=0 TO 23)
```

CHARACTER DISPLAY

```
POKE 50,255    WHITE ON BLACK
POKE 50,63     BLACK ON WHITE (INVERSE)
POKE 50,       BLINKING
```

SCREEN FORMAT

GRAPHICS

```
POKE -16304,0  SET COLOR GRAPHICS
POKE -16303,0  SET TEXT MODE
POKE -16302,0  CLEAR MIXED GRAPHICS
POKE -16301,0  SET MIXED GRAPHICS
POKE -16300,0  CLEAR DISPLAY PAGE 2 (BASIC COMMANDS USE
               PAGE 1 ONLY)
POKE -16299,0  SET DISPLAY TO PAGE 2
POKE -16298,0  CLEAR HIRES GRAPHICS
POKE -16297,0  SET HIRES GRAPHIC MODE
CALL -1994     CLEARS UPPER 20 LINES OF PAGE 1 TO REVERSED
               @ SIGNS. IF IN LOW-RES GRAPHICS MODE, THIS
               CLEARS THE UPPER 40 LINES OF GRAPHICS SCREEN
               TO BLACK (PAGE 1 ONLY).
CALL -1998     CLEARS ENTIRE TEXT PAGE 1 TO REVERSED @ SIGNS.
               IF IN PAGE 1 LOW-RES GR, THIS CLEARS THE
               ENTIRE SCREEN TO BLACK.
CALL -12274    CLEARS CURRENT HI-RES SCREEN TO BLACK
CALL -12270    CLEARS CURRENT HI-RES SCREEN TO HCOLOR
               MOST RECENTLY PLOTTED.
               TEXT
CALL -936      HOME CURSOR AND CLEAR SCREEN (ESC-@)
CALL -958      CLEAR FROM CURSOR TO END OF PAGE (ESC-F)
CALL -868      CLEAR FROM CURSOR TO END OF LINE (ESC-E)
CALL -922      LINE FEED (CTRL-J)
CALL -912      SCROLL UP ONE LINE.
            KEYBOARD
X=PEEK (-16384)READ KEYBOARD; IF X(127 THEN KEY WAS PRESSED.
               ALWAYS CLEAR KEYBOARD STROBE AFTER READING
               KEYBOARD.

POKE -16368,0  CLEARS KEYBOARD STROBE.
            SOUND
X=PEEK(-16336) TOGGLES SPEAKER (1 CLICK).
POKE-16336,0
            CASSETTE

X=PEEK(-16352) TOGGLES CASSETTE OUTPUT ONCE (1 CLICK ON
               CASSETTE RECORDING).
            GAME PADDLES
X=PEEK(-16287) READ PDL(0) PUSH BUTTON SWITCH. IF X)127 ,THEN
               SWITCH IS "ON".
X=PEEK(-16286) READ PDL(1) PUSH BUTTON SWITCH. IF X)127 ,THEN
               SWITCH IS "ON".
X=PEEK(-16285) READ PDL(2) PUSH BUTTON SWITCH. IF X)127 ,THEN
               SWITCH IS "ON".

POKE -16296,1  CLEAR GAME I/O AN0 OUTPUT (OFF-3.5V HIGH).
POKE -16295,0  SET GAME I/O AN0 OUTPUT (ON-.3V LOW).
POKE -16294,1  CLEAR GAME I/O AN1 OUTPUT (OFF-3.5V HIGH).
POKE -16293,0  SET GAME I/O AN1 OUTPUT (ON-.3V LOW).
POKE -16292,1  CLEAR GAME I/O AN2 OUTPUT (OFF-3.5V HIGH).
POKE -16291,0  SET GAME I/O AN2 OUTPUT (ON-.3V LOW).
POKE -16290,1  CLEAR GAME I/O AN3 OUTPUT (OFF-3.5V HIGH).
POKE -16289,0  SET GAME I/O AN3 OUTPUT (ON-.3V LOW).
CALL -1250     MONITOR S/R TO READ PADDLE - X-REG CONTAINS
               PADDLE # (0 TO 3)
```

PEEKS - POKES & CALLS

MONITOR CALLS

THERE ARE MANY ROUTINES IN THE APPLE II MONITOR THAT CAN BE CALLED FROM WITHIN A BASIC PROGRAM. THEY CAN BE USED TO DEBUG PROGRAMS OR ENHANCE YOUR PROGRAM DEVELOPMENT. THE FOLLOWING IS A LIST (ALBEIT INCOMPLETE) OF SOME OF THOSE CALLS.....

```
CLEAR THE SCREEN ..... CALL  -936
LINE FEED ............ CALL  -922
SCROLL SCREEN ........ CALL  -912
NORMAL MODE .......... CALL  -380
INVERSE MODE ......... CALL  -384
DISPLAY REGISTERS ..... CALL -321
  A=XX  X=XX  Y=XX  P=XX  S=XX
ENTER MONITOR ........ CALL  -155
ENTER MONITOR WITH DOS ..... CALL -151
RING BELL ............ CALL  -198
SAVE REGISTERS ....... CALL  -182
SCAN INPUT BUFFER ..... CALL -144
LIST INTEGER BASIC ..... CALL -8117
RUN INTEGER PROGRAM ..... CALL -6090
SAVE INTEGER (TAPE) ..... CALL -3776
LOAD INTEGER (TAPE) ..... CALL -3973

CLEAR GRAPH SCREEN (LOWRES). CALL -1998
CHANGE COLOR -) COLOR+3 .... CALL -1953
RESET TEXT MODE ..... CALL -1233

ADVANCE CURSOR ..... CALL -1036
BACKSPACE CURSOR ..... CALL -1008
CURSOR MODE UP ..... CALL  -998
CURSOR MOVE DOWN ..... CALL  -922

CLEAR TO END OF LINE ..... CALL  -868
CLEAR TO END OF SCREEN ..... CALL  -958

WAIT FOR KEY PRESS ..... CALL  -756
```

GET A LINE OF INPUT
THREE ROUTINES
SELECTS DIFFERENT OPTIONS FOR
LINE FEED & PROMPT CHAR DISPLAY

```
LINE FEED,PROMPT, AND WAIT.. CALL  -665
PROMPT,NO LINE FEED & WAIT.. CALL  -662
NO PROMPT OR LINE FEED; WAIT CALL  -657
```

ALL OF THESE CALLS RESPOND TO THE ESC SEQUENCE AND RT AND LT ARROWS. INPUTTED CHARACTERS ARE FOUND IN THE INPUT BUFFER ($200-$2FF HEX OF 512 - 767 DECIM)

SWAPPING GAME PADDLE BUTTONS BY POKES:
CHANGE BUTTON 0 TO 1:POKE 17954,98
BUTTON 0 TO 2:POKE 17954,99
BUTTON 1 TO 0:POKE 17861,97 AND POKE 18123,97
BUTTON 1 TO 2:POKE 17861,99 AND POKE 18123,99.

INTEGER BASIC CALLS

```
-155  ENTER MONITOR WITH BELL
-211  BELL, PRINT ERR
-259  READ FROM TAPE
-307  WRITE TO TAPE
-336  SCRATCH BASIC PROGRAM
-380  NORMAL OR POKE 50,255
-384  INVERSE OR POKE 50,63
-676  BELL, WAIT FOR (CR)
-868  CLEAR CURSOR TO END OF LINE
-912  SCROLL 1 LINE
-922  LINE FEED WITH NO (CR)
-936  HOME CLEAR SCREEN
-958  CLEAR SCREEN FROM CURSOR
-1052 IMMEDIATE BELL
-1087 CALCULATE TEXT BASE ADDR
-1148 DIVIDE ROUTINE
-1181 MULTIPLY ROUTINE
-1205 NORMAL WINDOW
-1216 GRAPHICS SCREEN
-1223 TEXT SCREEN
-1233 SCREEN INITIALIZE,RESET TEXT MODE
-1250 READ PADDLE CONTROLS
-1321 DISPLAY REGISTERS
-1935 READ POINT LO-RES SCRN 1
-1948 ADJUST COLOR BYTE FOR BOTH HALVES EQUAL
-1953 CHANGE COLOR+3
-1977 CALC GRAPHICS BASE ADDR
-1998 CLEAR GRAPHICS SCREEN
-2008 DRAW VLIN
-2023 HLIN
 2048 PLOT
-2458 ENTER MINI ASM
-3776 SAVE INT PROG FROM TAPE
-3973 LOAD INT PROG FROM TAPE
-6090 RUN
-8192 RESET INT BASIC KILL WORK SPACE
```

MORE HANDY CALLS

```
CALL -1036 ADVANCE CURSOR
CALL -1027 OUTPUT A REG AS ASCII ON TEXT SCREEN 1
CALL -1008 BACKSPACE CURSOR
CALL -998 MOVE CURSOR UP
CALL -990 PERFORM VERTICAL TAB
CALL -980 ESCAPE FUNCTIONS
CALL -926 CARRIAGE RETURN
CALL -856 WAIT LOOP
CALL -741 MONITOR KEYIN ROUTINE
CALL -715 READ KEY & PER ESC FUN IF NECESSARY
CALL -670 PERFORM A LINE CANCEL(/)
CALL -665 PERFORM LINE FEED AND WAIT FOR INPUT
```

PEEKS, POKES & CALLS

```
CALL -657 GET A LINE
CALL -550 PRINT A BYTE AS 2 HEX DIGITS
CALL -541 PRINT HEX DIGIT
CALL -531 OUTPUT CHAR. VIA USER OUTPUT
CALL -528 MONITOR CHAR. OUTPUT
CALL -468 PERFORM MEMORY MOVE
CALL -458 PERFORM MEMORY VERIFY
```

POKES

POKE DEC ADD	EXPLANATION VALUE LIMITS
POKE 32,X	WINDOW LEFT 0-39
POKE 33,X	WINDOW WIDTH 0-40
POKE 34,X	WINDOW TOP 0-24
POKE 35,X	WINDOW BOTTOM 0-24
POKE 36,X	CURSOR HORIZONTAL
POKE 37,X	CURSOR VERTICAL
POKE 38,X	GBASL GRAPHICS BASEADDRESS
POKE 39,X	GBASH
POKE 40,X	BASL TEXT SCREEN BASE ADDR
POKE 41,X	BASH
POKE 42,X	BAS2L TEMP.BASE ADDRESS
POKE 43,X	BAS2H
POKE 48,X	COLOR (0-15)
POKE 49,X	MODE
POKE 50,X	COUT TEXT MODES 255-NORMAL MODE 63-INVERSE MODE 127-FLASHINZN..L\
POKE 51,X	PROMPT CHARACTER
POKE 54,L	CSWL
POKE 55,H	CSWH:CHARACTER OUTPUT
POKE 56,L	KSWL
POKE 57,H	KSWH:CHARACTER INPUT

```
THE POKES BELOW MAY BE USED BEFORE A CALL -327 TO CALL A
MACHINE LANGUAGE PROGRAM WITH PARAMETERS
POKE 58,L     PCL
POKE 59,H     PCH
POKE 69,X     A-REGISTER
POKE 70,X     X-REGISTER
POKE 71,X     Y-REGISTER
POKE 72,X     STATUS REGISTER
POKE 73,X     STACK POINTER
POKES BELOW (60-67 CAN BE USED IN CONJUNCTION WITH VARIOUS
CALLS TO PERFORM MANY SYSTEM MONITOR COMMANDS FROM BASIC
(SEE CALL LIST)
   POKE 61,H    A1H
   POKE 62,L    A2L
   POKE 63,H    A2H
   POKE 66,L    A4L
   POKE 67,H    A4H
MOST DOK IS FOR INTEGER BUT SOME MAY BE USED IN APPLESOFT.
SOME CALLS CANNOT BE EXECUTED IN THE MIDDLE OF A BASIC
PROGRAM LINE, BUT MUST BE AT THE END OF THE STATEMENT.
TO GET INTO MONITOR W/BELL
  CALL -155
INVERSE
  POKE 50,63 OR CALL -384
NORMAL
  POKE 50,255 OR CALL -380
DISK CATALOG, DOS 3.2.1, 48K
  AD98
OTHER LOCATIONS FOR 48K DISK, DOS 3.2.1 (MOST WILL WORK W/3.3)
CONTROL-D  AAB2
NAME APPLESOFT   AAB8
WORDS "DISK VOLUME"   B3AD-BA  (IN REVERSE ORDER)
REENTER DOS
    9DBF OR 3D0  CTRL-C
    9D84 OR 3D3  CTRL-B (NEW)
    9DEA   RESTORE 3D0-3FF
FROM NOW ON HEX WILL HAVE $ IN FRONT
FOR ROM APPLESOFT/LANG SYSTEM APPLESOFT
HGR  $F3E2    HGR2 $F3D8
BKGND  CLR HIRES TO LAST COLOR PLOTTED   $F3F6
RUN $D566  54630
CONT $D898 55448


ISCNTC (CTRL-C CHECK) $D858 55384
   EXECUTES BREAK ROUTINE IF CTRL-C HIT
SUPER HI-RES ROUTINE BY BOB BISHOP
  ENTER WITH X% FROM 0 TO 559, Y% FROM 0 TO 191
    1000 XX%=X%/4 : M%=X%-4*XX%
    1040 IF M%=0 THEN HCOLOR=2
    1050 IF M%=1 THEN HCOLOR=6
    1060 IF M%=2 THEN HCOLOR=1
    1070 IF M%=3 THEN HCOLOR=5
    1080 HPLOT X%/2, Y%
    1090 RETURN
HI-RES SCRN FUNCTION FOR ROM APPLESOFT
    1050 FOR J=768 TO 806:READ K:POKE J,K:NEXT J
    1060 DATA 32,227,223,133,133
    1070 DATA 132,134,169,208,32
    1080 DATA 192,222,165,18,72
    1090 DATA 165,17,72,32,185
    1100 DATA 246,32,17,244,165
    1110 DATA 48,49,38,240,2
    1120 DATA 169,1,168,32,1
    1130 DATA 227,76,91,218
    1140 POKE 1013,76:POKE 1014,0:POKE 1015,3
    THE SYNTAX IS &A=B,C WHERE B,C IS THE HIRES COORDINATE
    A WILL EQUAL 1 OR 0 DEPENDING IF THE POINT IS ON OR OFF
    DIFFERENT VARIABLES CAN BE USED, AND B AND/OR C CAN BE
    REPLACED WITH NUMBERS. COLORS ARE IGNORED.
LOCATION FOR APSOFT USR(X) FUNCTION JUMP INSTRUCTION:  $A-$C
LAST APPLESOFT LINE NUMBER EXECUTED BEFORE STOP, END, OR CTL-C
   $77-$78
CURRENT APPLESOFT LINE NUMBER: $75-$76
INTEGER BASIC FORMULA FOR POKEING ONTO TEXT SCREEN:
    I=ROW J=COLUMN P=LOCATION
    P=1023+((I-1)MOD8)*128+((I-1)/8)*40+J
APPLESOFT MOD FUNCTION IN INTEGER BASIC:  A = X MOD Y
    APPLESOFT    :  A = X - INT(X/Y) * Y
                OR   A = X - Y * INT(X/Y)
```

PEEKS, POKES & CALLS

```
CALL -626      PRINT CARRIAGE RETURN (DESTROYS ACC. & Y-REG.).
CALL -622      PRINT A1H,A1L. EXAMPLE: 10 POKE 60,A1H
                                       20 POKE 61,A1L
                                       30 END
               .....THEN RUN,  CALL -622
CALL -550      PRINT CONTENTS OF ACCUM. AS 2 HEX DIGITS.
CALL -541      PRINT A HEX DIGIT.
CALL -531      OUTPUT CHARACTER IN ACCUM. (DESTROYS ACC. &
               Y-REG COUT).
CALL -528      GET MONITOR CHARACTER OUTPUT.
CALL -468      PERFORM MEMORY MOVE A1-A2 TO A4.
               EXAMPLE: 10 POKE 60,LOB
                        20 POKE 61,HOB
                        30 POKE 62,LOE
                        40 POKE 63,HIE
                        50 POKE 66,LOD
                        60 POKE 67,HID
               ....THEN RUN,  CALL-468
        NOTE:  LOB IS LO-BYTE OF BEGINING OF MEMORY TO MOVE
               HIB IS HIGH, LOE IS LO END, HIE IS HIGH, LOD
               IS LOW DESTINATION, HID IS HIGH.
CALL -458      PERFORM MEMORY VERIFY.
CALL -418      DISASSEMBLE 20 INSTRUCTIONS.
CALL -384      SET INVERSE MODE.
CALL -380      SET NORMAL.
CALL -378      SET I FLAG.
CALL -375      SET KEYBOARD.
CALL -336      JUMP TO BASIC.
CALL -333      CONTINUE BASIC.
CALL -330      MEMORY LOCATION "GO".
CALL -321      DISPLAY A,S,Y,P,S REG. (CURRENT VALUES).
CALL -318      PERFORM MONITOR TRACE.
CALL -307      WRITE OUT CASSETTE TAPE.
CALL -259      READ FROM CASSETTE TAPE (LIMITS A1 TO A2).
CALL -211      PRINT "ERR" & SOUNDS BELL (DESTROYS ACCUM. &
               Y-REG.).
CALL -198      PRINT BELL (DESTROYS ACCUM. & Y-REG.).
CALL -193      MONITOR & SWEET-16 "RESTORE".
CALL -188      MONITOR "RESTR1"
CALL -182      MONITOR & SWEET-16 "SAVE".
CALL -180      MONITOR "SAV1".
CALL -167      ENTER MONITOR RESET, TEXT MODE, "COLD START".
CALL -155      ENTER MONITOR, RING BELL, "WARM START".
CALL -151      ENTER MONITER, NO BELL.
CALL -144      SCAN INPUT BUFFER (ADDRESS$200...).
            ERRORS

POKE 216,0     RESETS  ERRFLG
X=PEEK(216)    IF X=127, ERROR DETECTED.
Y=PEEK(212)    Y IS ERROR CODE RETURNED IN DECIMAL.
    ?(222)MICRO
    * THE FOLLOWING STATEMENT SETS X EQUAL TO LINE NUMBER OF
      THE STATEMENT WHERE AN ERROR OCCURED IF AN ONERRGOTO
      STATEMENT HAS BEEN EXECUTED:
     340X=PEEK(218)+PEEK(219)*256
```

DECIMAL VALUE	ERROR TYPE ENCOUNTERED
0	NEXT WITHOUT FOR
16	SYNTAX
22	RETURN WITHOUT GOSUB
42	OUT OF DATA
53	ILLEGAL QUANTITY
69	OVERFLOW
77	OUT OF MEMORY
90	UNDEFINED STATEMENT
107	BAD SUBSCRIPT
120	REDIMENSIONED ARRAY
133	DIVISION BY ZERO
163	TYPE MISMATCH
176	STRING TOO LONG
191	FORMULA TOO COMPLEX
224	UNDEFINED FUNCTION
254	BAD RESPONSE TO AN INPUT STATEMENT
255	CTRL C INTERRUPT ATTEMPTED

DISK ERROR MESSAGES (?DOS3.1)

X=PEEK(222) X=ERROR CODE

DECIMAL VALUE	ERROR MESSAGES
4	WRITE PROTECTED
5	END OF DATA
6	FILE NOT FOUND
7	VOLUME MISMATCH
8	DISK I/O
9	DISK FULL
10	FILE LOCKED
11	COMMAND SYNTAX
12	NO FILE BUFFERS AVAILABLE
13	NOT BASIC PROGRAM
14	PROGRAM TOO LARGE
15	NOT BINARY FILE ERROR

DISK

```
CALL 976       ACTIVATES DOS IF IN MEMORY (3D0G).
CALL -16152    ADDRESS TO POWER DOWN DISK IN SLOT 6.
CALL -16151    ADDRESS TO POWER UP DISK IN SLOT 6.
                SLOT
CALL -16256    DEVICE SELECT 0 ?

CALL -16240    DEVICE SELECT 1 ?

CALL -16224    DEVICE SELECT 2 ?
CALL -16208    DEVICE SELECT 3 ?
CALL -16192    DEVICE SELECT 4 ?
CALL -16176    DEVICE SELECT 5 ?
CALL -16160    DEVICE SELECT 6 ?
CALL -16144    DEVICE SELECT 7 ?
            SLOT I/O
CALL -16128    SAME AS PR#1. STANDARD CHARACTER I/O S/R ENTRY
               POINT FOR SLOT 1.
CALL -15842    FOR SLOT 2?

CALL -15616    FOR SLOT 3?
CALL -15360    FOR SLOT 4?
CALL -15104    FOR SLOT 5?
CALL -14848    FOR SLOT 6?
```